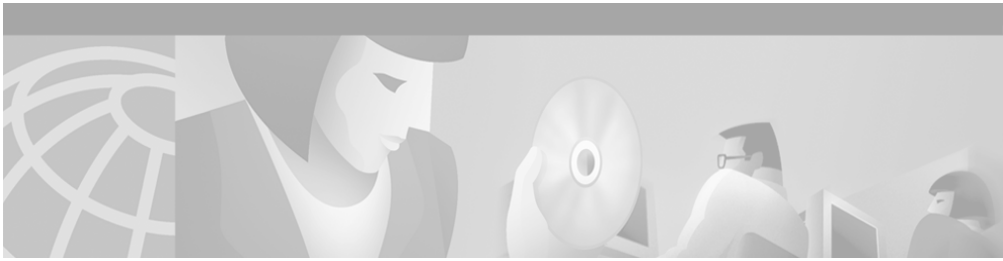


Cisco 10005 ESR DC Power Entry Module Installation

March 30, 2001

This installation note provides procedures for installing and replacing DC power entry modules (PEMs) in a Cisco 10005 edge services router (ESR).

Contents

The following sections are included in this installation note:

- Product Description, page 2
- Prerequisites and Preparation, page 2
- Adding or Replacing a DC PEM, page 8
- FCC Class B Compliance, page 20
- Related Documentation, page 21
- Obtaining Documentation, page 22
- Obtaining Technical Assistance, page 23

Cisco Systems

Corporate Headquarters: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

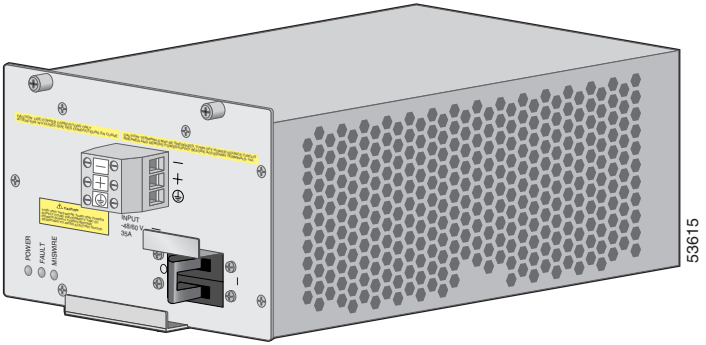
Copyright © 2001. Cisco Systems, Inc. All rights reserved.

78-12653-01

Product Description

The DC PEM (Figure 1) provides filtering and supplies DC power to the chassis electronics. The DC PEM receives input power (–48 VDC from building centralized power source) through terminal block connections located on the front panel of the PEM.

Figure 1 DC PEM



The Cisco 10005 chassis has two compartments for PEMs. The chassis can operate with a single PEM; install two PEMs if you require power redundancy.

Prerequisites and Preparation

Before you perform any of the procedures in this guide, we recommend that you:

- Read the safety guidelines in the next section and review the electrical safety and ESD-prevention guidelines in the *Cisco 10005 ESR Hardware Installation Guide*.
- Ensure that you have all of the necessary tools and equipment (see the "Required Tools and Equipment" section on page 7).
- Have access to the following documents during the installation:
  - *Technology of Edge Aggregation: Cisco 10000 Series Edge Services Router* (shipped with your router and available for viewing or download at Cisco.com)

- *Cisco 10005 ESR Hardware Installation Guide* (shipped with your router and available for viewing or download at Cisco.com)
- *Cisco 10000 Series ESR Troubleshooting Guide* (an online document available for viewing or download at Cisco.com)
- *Cisco 10000 Series ESR Software Configuration Guide* (an online document available for viewing or download at Cisco.com)

Safety Guidelines

Before you begin the installation or replacement procedure, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Before you install, configure, or perform maintenance on the router, review the documentation for the procedure you are about to perform, paying special attention to the safety warnings. If you need translations of the safety warnings, refer to the "Translated Safety Warnings" appendix of the *Cisco 10005 ESR Hardware Installation Guide*.

Warning **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix "Translated Safety Warnings" in the installation guide that accompanied this device.)**

Waarschuwing **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel "Translated Safety Warnings" (Vertalingen van veiligheidsvoorschriften) in de installatiegids die bij dit toestel is ingesloten, raadplegen.**

Varoitus **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät tämän laitteen mukana olevan asennusoppaan liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)**

Attention **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité) dans le guide d'installation qui accompagne cet appareil.**

Warnung **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise) in der diesem Gerät beiliegenden Installationsanleitung.)**

Avvertenza **Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza), del manuale d'installazione che accompagna questo dispositivo.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler] i installasjonsveiledningen som ble levert med denne enheten.)**

Aviso **Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos fisicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança", no guia de instalação que acompanha este dispositivo).**

¡Advertencia! **Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings," en la guía de instalación que se acompaña con este dispositivo.)**

Varning! **Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar] i den installationshandbok som medföljer denna anordning.)**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and the heat can cause serious burns or weld the metal object to the terminals.**

Warning **This product requires short-circuit (overcurrent) protection to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.**

Warning **Only a DC power source that is isolated from AC mains with reinforced insulation, and that complies with the other safety extra-low voltage (SELV) requirements in UL1950, CSA 950 3rd Edition, EN 60950, and IEC950, can be connected to a Cisco 10005 system. This requirement ensures that in a catastrophic power source fault condition, hazardous voltages are not present on power terminals and connectors.**

Warning **Use copper conductors only.**

Required Tools and Equipment

Table 1 lists the tools and equipment you need to install a DC PEM.

Table 1 Tools and Equipment

Quantity	Description	Comments
1	Antistatic wrist or ankle strap with connection cord	Prevents damage to equipment from electrostatic discharge (ESD).
1	Number 2 phillips screwdriver	—
1	Flat-blade screwdriver. We recommend a torque-limiting screwdriver.	Blade should measure 1.0 mm thick by 4.0 mm wide. An appropriate screwdriver is available from Phoenix Contact Inc. of Harrisburg, PA, USA.
1	Wire stripping tool	Choose a tool that does not nick the internal wire.
2 or 4	Tie wraps	—
1	Metric measuring tape or ruler	—
1	Marking pen	—
1	Voltmeter	—
3 or 6 (length varies)	6 AWG (recommended) copper wires long enough to reach from the Cisco 10005 chassis to the DC power source. • Three wires (two power, one ground) are needed for a single DC power source. • Six wires (four power, two ground) are needed for two DC power sources.	The wires must meet these specifications: • Conductor size 6 AWG or 8 AWG (6 AWG preferred) • Diameter: – Minimum: 3.38 mm – Maximum: 4.52 mm • Multistranded copper construction

Adding or Replacing a DC PEM

This section describes how to add or replace a DC PEM in a Cisco 10005 chassis. It contains these procedures:

- Installing a Second DC PEM
- Replacing a DC PEM
- Wiring a DC PEM
- Troubleshooting the Installation

Note Before you perform any of the procedures in this document, be sure that you have connected the chassis to earth ground as described in the *Cisco 10005 ESR Hardware Installation Guide*.

Installing a Second DC PEM

Warning **Never install an AC power module and a DC power module in the same chassis.**

Follow these step to install a second DC PEM for redundancy.

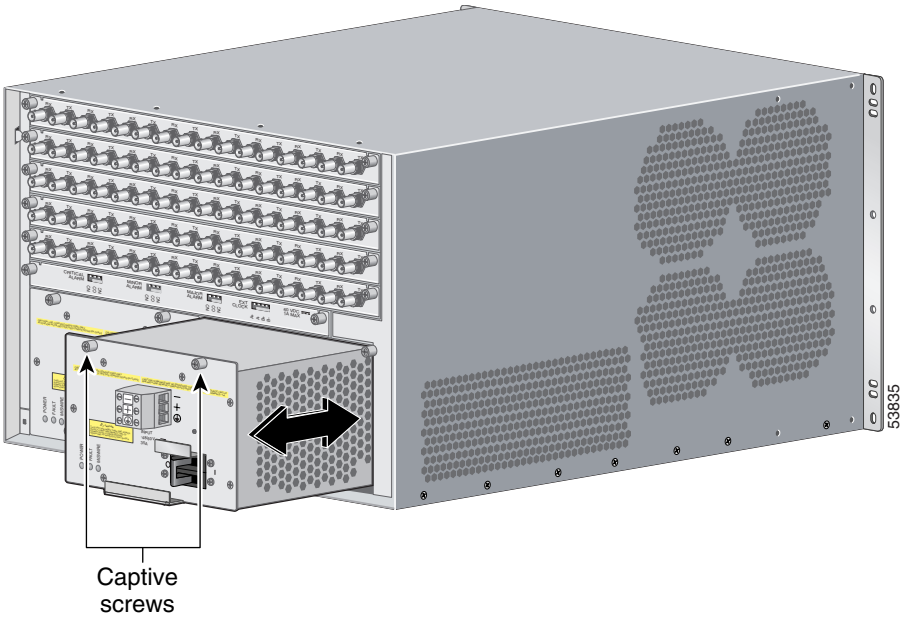
Caution Do not power off the DC PEM that is providing power to the router. If you do so, all data traffic halts.

Step 1 Put on an antistatic wrist or ankle strap. Connect the strap to the ESD jack on the front of the chassis or to a bare metal surface of the chassis.

Step 2 Ensure that the power switch on the new DC PEM is set to 0 (Off).

Step 3 Insert the new DC PEM (Figure 2) all the way into the power bay to ensure a secure connection to the midplane. Tighten the captive screws.

Figure 2 Inserting a DC PEM



To complete the installation, follow the steps in the "Wiring a DC PEM" section on page 12.

Replacing a DC PEM

Warning **Never install an AC power module and a DC power module in the same chassis.**

Follow these steps to replace a DC PEM:

Step 1 Put on an antistatic wrist or ankle strap. Connect the strap to the ESD jack on the front of the chassis or to a bare metal surface of the chassis.

Step 2 Set the power switch on the PEM that you are replacing to the 0 (Off) position. If you have redundant PEMs, be sure to leave one PEM turned on.

Caution Do not power off both of the DC PEMs in a redundant system, or the system shuts and down all data traffic stops. Only power off the DC PEM you are replacing.

Step 3 Turn off power to the branch circuit that provides power to the PEM that you are replacing.

Step 4 At the terminal block on the PEM that you turned off, use a voltmeter to verify that there is no power present.

Warning **Do not allow the test probes of the voltmeter to touch each other while they are touching the power terminals. This is an ENERGY HAZARD to you, to the voltmeter, and to the wires connecting the router to its power source.**

Step 5 Use a screwdriver to loosen the screws on the PEM terminal block and remove the wires. Be sure to disconnect the ground (bottom wire) last.

Warning **When you are installing or replacing the unit, the ground connection must always be made first and disconnected last.**

Step 6 Loosen the captive screws on the DC PEM you are removing and pull the PEM from the chassis using the handle on the faceplate (Figure 3).

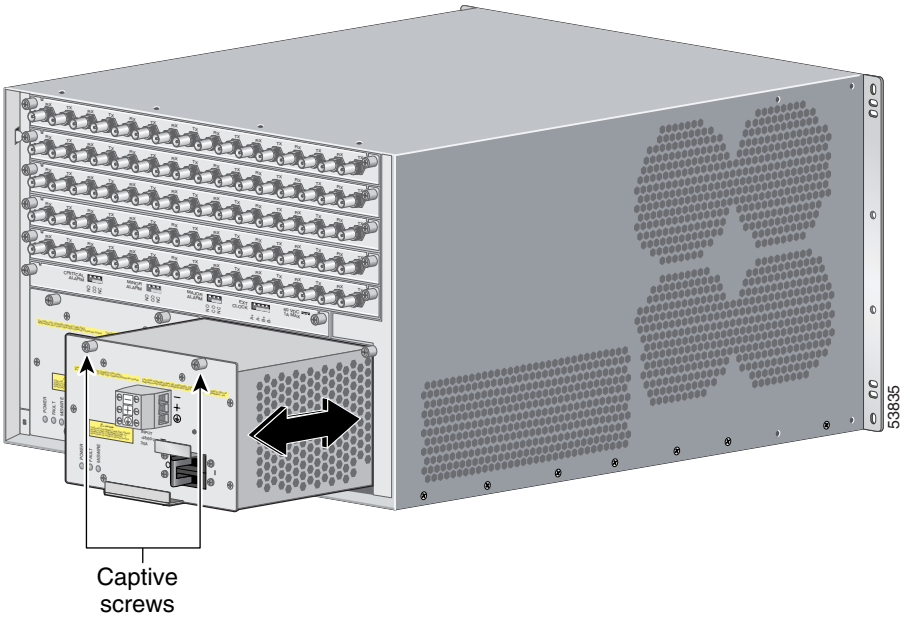
Step 7 Ensure that the power switch on the new DC PEM is set to 0 (Off).

Step 8 Insert the new DC PEM all the way into the power bay (see Figure 3) to ensure a secure connection to the midplane. Tighten the captive screws that hold the PEM in place.

If you do no not install a new PEM right away, install a blank faceplate over the empty power bay.

Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they confine electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, power modules, and faceplates are in place.**

Figure 3 Removing and Replacing a DC PEM



To complete the installation, follow the procedures in the next section.

Wiring a DC PEM

This section provides procedures for connecting a DC PEM to a DC power source.

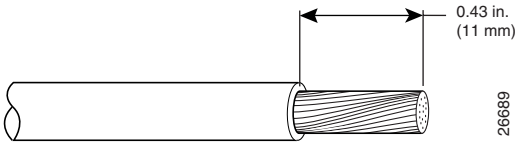
Preparing to Connect Power and Ground

Follow these steps to prepare the power and ground wires to be connected to the Cisco 10005 DC PEM.

Step 1 Cut the ends of the power and ground wires so that the ends are straight, not slanted.

Step 2 Measure and strip 0.43 inches (11 mm) of insulation off the end of each DC power and ground wire (Figure 4). Trim the end of the insulation so that it is straight, as shown in Figure 4, not slanted.

Figure 4 Stripping Insulation



Warning **Remove the covering from exactly the specified length of each wire. If you strip too much of the covering, exposed wire protruding from the terminal block will create an electrical hazard. If you strip too little of the covering, the wire might not make a good contact with the terminal, or it might not be held securely in place in the terminal block.**

Step 3 Prepare the other end of each wire to be connected to a DC power source according to the requirements of your site.

Step 4 Connect the power and ground wires to the DC power source.

Connecting DC Ground

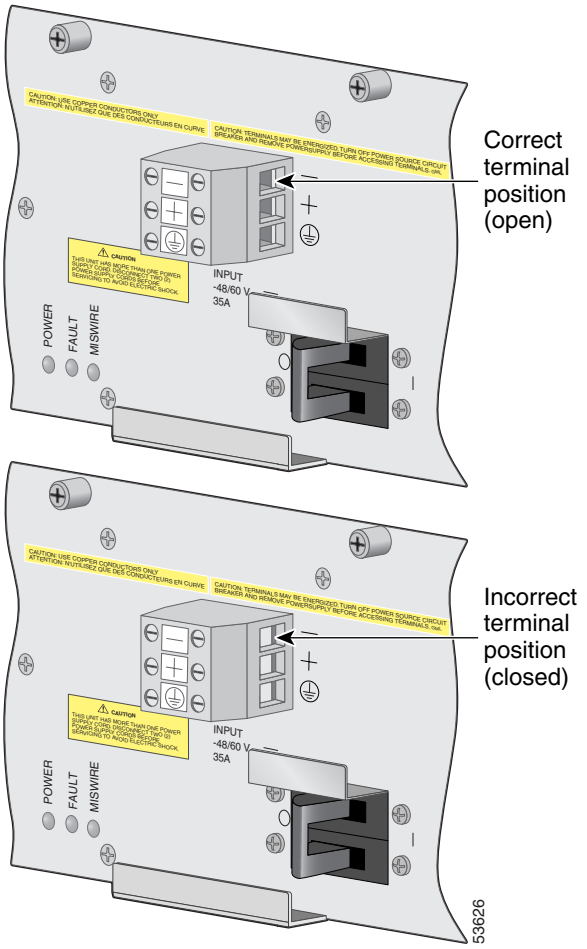
Warning **When you are installing or replacing the unit, the ground connection must always be made first and disconnected last.**

To attach the grounding wire to the grounding receptacle on the Cisco 10005 DC PEM, perform these steps:

Step 1 Set the DC PEM power switch to the 0 (Off) position.

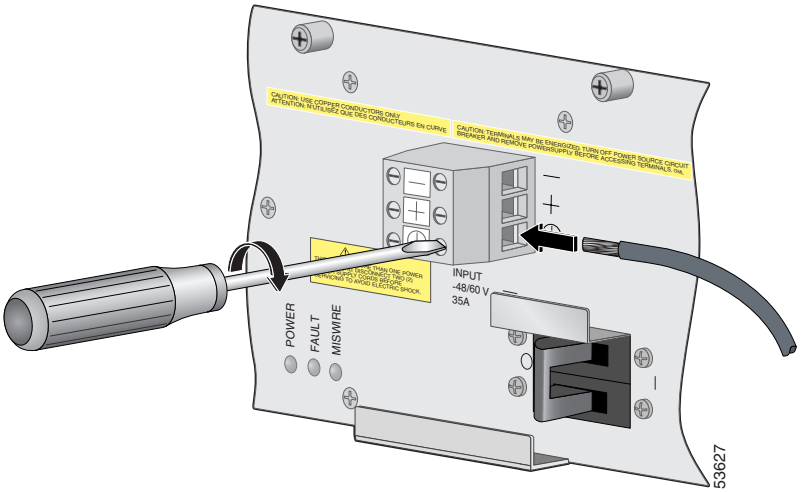
Step 2 Turn all three screws on the PEM terminal block counterclockwise to fully open the terminal connectors. This step ensures that the correct opening is presented for the wires (Figure 5).

Figure 5 Positioning the Power and Ground Terminals to Accept Wires



Step 3 Insert the end of the grounding wire into the grounding receptacle, which is the bottom receptacle in the terminal block on the PEM (Figure 6).

Figure 6 Insert Grounding Wire into Grounding Receptacle



Step 4 Ensure that no copper wire strands are left outside the receptacle.

Step 5 Use the screwdriver to tighten the ground screw in the terminal block to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten in a clockwise direction.) To avoid breaking the screw, do no exceed 2.3 newton meters.

Step 6 Pull on the wire to ensure that it is held firmly in place.

Step 7 Make sure that the other end of the wire is connected to ground at the DC power source.

Step 8 If you are connecting two power sources to the Cisco 10005 ESR, repeat this procedure for the second PEM.

Connecting DC Power

Warning **Only a DC power source that is isolated from AC mains with reinforced insulation, and that complies with the other safety extra-low voltage (SELV) requirements in UL1950, CSA 950 3rd Edition, EN 60950, and IEC950, can be connected to a Cisco 10005 system. This requirement ensures that in a catastrophic power source fault condition, hazardous voltages are not present on power terminals and connectors.**

Follow these steps to connect DC power to the Cisco 10005 ESR. Refer to Figure 7.

Step 1 Ensure that power in the DC circuit is off.

Step 2 Ensure that the PEMs are fully inserted into the chassis and secured with their captive screws.

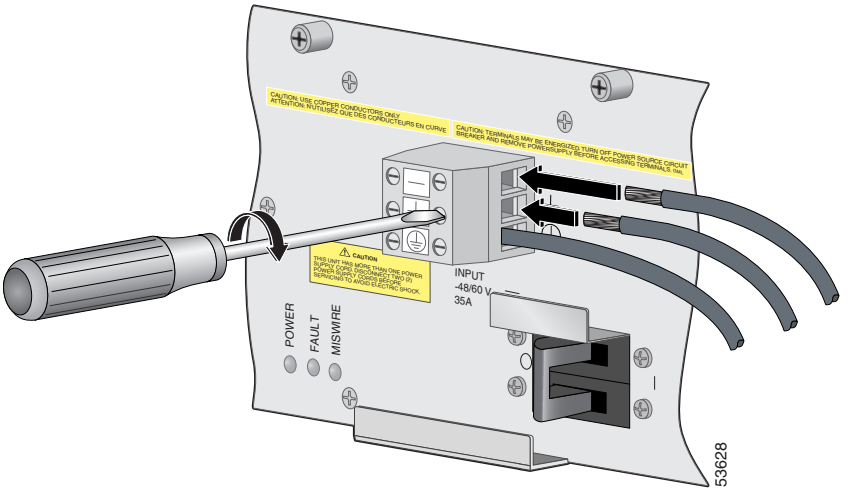
Step 3 Ensure that the circuit breaker on the newly installed PEM is set to 0 (Off).

Step 4 Turn the + and – screws on the new PEM's terminal block counter-clockwise to fully open the terminal connectors. This step ensures that the correct opening is presented for the wires (see Figure 5).

Step 5 Insert the battery return wire from the external power source into the receptacle labeled + (positive) on the PEM (Figure 7). The stripped part of the wire must be fully inserted so that no bare wire is exposed. Use the screwdriver to tighten the terminal screw to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten the screws clockwise.)

Warning **The illustration shows the DC power supply terminal block. Wire the DC power supply as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. The ground wire must always be connected first and disconnected last.**

Figure 7 Connecting Power to the Terminal Block



Step 6 Insert the power lead from the battery –48V power source into the receptacle labeled – (negative) on the PEM. The stripped part of the wire must be fully inserted, so that no bare wire is exposed. Use the screwdriver to tighten the terminal screw to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten the screws clockwise.)

Step 7 If you are connecting a second power source, repeat Step 5 and Step 6 to wire the second power source to the second PEM.

Step 8 If your chassis contains only one PEM, install a blank faceplate over the empty power bay.

Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they confine electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, power modules, and faceplates are in place.**

Step 9 Secure the power cabling to the chassis by feeding a tie wrap through the slot on the side of the chassis and binding the cables. Dress the cables so that the fan assembly on the right and the air filter on the left can be removed if necessary.

Checking the DC Power Connection

Follow these steps to verify that you have correctly connected DC power to the Cisco 10005 chassis:

Step 1 Make sure the circuit breaker on the PEM you have just installed is still set to 0 (Off).

Step 2 Turn on power to the DC circuit.

Step 3 Use a voltmeter to check the voltage at the terminal block on the PEM. Connect the voltmeter's positive contact to the positive (+) terminal on the terminal block. Connect the voltmeter's negative contact to the negative (–) terminal on the terminal block. If the power is wired correctly:

- The voltmeter registers approximately +48VDC to +56VDC (or battery float voltage).
- The yellow Fault LED on the PEM lights.

Warning **Do not allow the test probes of the voltmeter to touch each other while they are touching the power terminals. This is an ENERGY HAZARD to you, to the voltmeter, and to the wires connecting the router to its power source.**

Step 4 Flip the circuit breakers on the PEMs to | (On). If the power is properly connected:

- The green Power LED lights on each PEM. The green LED indicates that the PEM is making power available to the chassis in the proper voltage range.
- The yellow Fault LED on each PEM goes out.
- The fans start to turn. A slight delay in fan startup is normal.

Troubleshooting the Installation

Table 2 provides information you can use to solve problems with a DC PEM.

Table 2 Troubleshooting the DC PEM

Symptom	Steps to Take
System fails to power on	Check that: • All power leads are connected to the Cisco 10005 and to a power source. • The power switches are in the | (On) position. • The Power LED on the PEM is on (green). • The fan assembly is fully inserted (Fan Status LED is green).
Power problems	• If the yellow Fault LED on the power module is on: – Make sure the power switch on the power module is set to | (On). – Make sure the power and ground wires are properly connected to the terminals on the PEM. Follow the wiring instructions carefully to ensure that you insert the wires into the correct openings in the terminal block. See the "Wiring a DC PEM" section on page 12 for details. • If the Miswire LED on the DC PEM is on, the –48V and return (RTN) wires are reversed. Power off the PEM, turn off the branch circuit that feeds power to the Cisco 10005, and reconnect the wires correctly. (See the "Wiring a DC PEM" section on page 12 for details.) • For more troubleshooting information, see the *Cisco 10000 Series ESR Troubleshooting Guide*.

FCC Class B Compliance

The equipment described in this manual generates and might radiate radio-frequency energy. If it is not installed in accordance with Cisco installation instructions, it might cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without written authorization from Cisco might result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment might be limited by FCC regulations, and you might be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

Related Documentation

This section lists the manuals in the Cisco 10000 series documentation set.

Manuals for All Cisco 10000 Series Routers

- *Technology of Edge Aggregation: Cisco 10000 Series Edge Services Router*
- *Cisco 10000 Series ESR Performance Routing Engine Installation*
- *Cisco 10000 Series ESR OC-12 Packet Over SONET Line Card Installation*
- *Cisco 10000 Series ESR OC-12 ATM Line Card Installation*
- *Cisco 10000 Series ESR Single-Port Gigabit Ethernet Line Card Installation*
- *Cisco 10000 Series ESR Channelized OC-12 Line Card Installation*
- *Cisco 10000 Series ESR 6-Port Channelized T3 Line Card Installation*
- *Cisco 10000 Series ESR Channelized STM-1 Line Card Installation*
- Release notes for the Cisco 10000 series ESR

These documents, which are available at Cisco.com, are online only:

- *Cisco 10000 Series ESR Software Configuration Guide*
- *Cisco 10000 Series ESR Troubleshooting Guide*
- *Cisco 10000 Series ESR Useful Links*
- Cisco 10000 technical reference documents

Hardware Documents for Cisco 10008 Routers

- *Cisco 10008 ESR Hardware Installation Guide*
- *Cisco 10008 ESR AC Power Entry Module Installation*
- *Cisco 10008 ESR DC Power Entry Module Installation*
- *Cisco 10008 ESR Blower Module Installation*

Hardware Documents for Cisco 10005 Routers

- *Cisco 10005 ESR Hardware Installation Guide*
- *Cisco 10005 ESR Hardware Overview and Maintenance Guide* (online only)
- *Cisco 10005 ESR AC Power Supply Installation*

- *Cisco 10005 ESR DC Power Entry Module Installation*
- *Cisco 10005 ESR Fan Assembly Installation*

Obtaining Documentation

The sections that follow provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- http://www.cisco.com
- http://www-china.cisco.com
- http://www-europe.cisco.com

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Attn Document Resource Connection
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1(P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

Use this document in conjunction with the documents listed in the "Related Documentation" section.

AccessPath, AtmDirector, Browse with Me, CCDA, CCDE, CCDP, CCIE, CCNA, CCNP, CCSI, CD-PAC, *CiscoLink*, the Cisco Net*Works* logo, the Cisco *Powered* Network logo, Cisco Systems Networking Academy, the Cisco Systems Networking Academy logo, Fast Step, Follow Me Browsing, FormShare, FrameShare, GigaStack, IGX, Internet Quotient, IP/VC, iQ Breakthrough, iQ Expertise, iQ FastTrack, the iQ Logo, iQ Net Readiness Scorecard, MGX, the Networkers logo, *Packet*, PIX, RateMUX, ScriptBuilder, ScriptShare, SlideCast, SMARTnet, TransPath, Unity, Voice LAN, Wavelength Router, and WebViewer are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, Discover All That's Possible, and Empowering the Internet Generation, are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Enterprise/Solver, EtherChannel, EtherSwitch, FastHub, FastSwitch, IOS, IP/TV, LightStream, MICA, Network Registrar, Post-Routing, Pre-Routing, Registrar, StrataView Plus, Stratm, SwitchProbe, TeleRouter, and VCO are registered trademarks of Cisco Systems, Inc. or its affiliates in the U.S. and certain other countries.

All other brands, names, or trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0102R)

Copyright © 2001, Cisco Systems, Inc.
All rights reserved.